Visit us - www.researchjournal.co.in ■ DOI : 10.15740/HAS/IRJAES/7.2/243-247
International Research Journal of Agricultural Economics and Statistics
Volume 7 | Issue 2 | September, 2016 | 243-247 ■ e ISSN-2231-6434

Research Paper

Rice based farming system models for enhancing profitability of small farm holders in Telangana

■ NIRMALA BANDUMULA AND AMTUL WARIS

See end of the paper for authors' affiliations

Correspondence to :
NIRMALA BANDUMULA
ICAR-Indian Institute of Rice Research, HYDERABAD (TELANGANA) INDIA
Email: bnirmaladrr@gmail.com

Paper History :
Received : *24.06.2016;*
Revised : *10.08.2016;*
Accepted : *27.08.2016*

ABSTRACT : Rice is cultivated on an area of about 1.67 million hectares with a production of 4.9 million tonnes in Telangana. The study has assessed the profitability of the major rice based integrated farming systems in Rangareddy district of Telangana. The data for the study were collected from 36 small holder rice farmers of three villages of Rangareddy district during 2016. The rice based integrated farming systems evaluated include, rice-rice, rice –pigeonpea-vegetable, rice-vegetable-dairy, rice-cotton-vegetable, rice-vegetable-dairy, rice-vegetable-sheep and rice- vegetable-fodder-dairy. The results indicate that the rice based farming systems allows farmers to realise higher profits than the conventional mono cropping of rice. The integration of rice with vegetable cultivation and pigeonpea cultivation/sheep/dairy resulted in higher B: C ratio than the cultivation of rice alone.

KEY WORDS : Rice based farming systems, Profitability,Small farm holders, Cost effective technologies

HOW TO CITE THIS PAPER : Bandumula, Nirmala and Waris, Amtul (2016). Rice based farming system models for enhancing profitability of small farm holders in Telangana. *Internat. Res. J. Agric. Eco. & Stat.*, **7** (2) : 243-247, **DOI : 10.15740/HAS/IRJAES/7.2/243-247.**

INTRODUCTION :

Integrated farming system (IFS) is a commonly used term to explain an integrated approach to farming as compared to monoculture approaches. Ideally, in this system an inter-related set of enterprises are used so that the "waste" from one component becomes an input for another part of the system, which reduces cost and improves production and income. An integrated farming system consists of a range of resource-saving practices that aim to achieve acceptable profits and high and sustained production levels, while minimizing the negative effects of intensive farming and preserving the environment (Lal and Miller, 1990 and Gupta *et al.*, 2012). The goals of IFS are to sustain agricultural production, maintain farm incomes, safeguard the environment and respond to consumer concerns about food quality issues. The basic principle behind IFS is to enhance the ecological diversity by choosing the appropriate cropping methodology with mixed cropping, crop rotation and crop combination and inter cropping so that there is less competition for water, nutrition and space and adopting eco-friendly practices. IFS can be taken up in all types of social systems as well as both in rainfed and irrigated areas where the farmers need more output from the limited resources. Thus, mono-cropping which restricts productivity per unit of land can be substituted by farming system approach. It is different from corporate farming due to its integration of different complementary components. Moreover, the IFS process is aimed at strengthening the nutritional security and employment generation (Sujit *et al.*, 2016).

The integrated farming system thus aims at introducing a change in the farming techniques for

maximum production in the cropping pattern and takes care of optimal utilization of resources. The farm as a unit is to be considered and the effective integration of the enterprises like poultry, forage crops, livestock combined with crop production are to be planned based on soil and climatic factors and resource endowments of the farmer. Assured regular cash flow is possible when the crop is combined with other enterprises. A judicious mix of agricultural enterprises like dairy, poultry, piggery, fishery, sericulture etc. suited to the given agro-climatic conditions and socio-economic status of the farmers would bring prosperity in the farming. No single farm enterprise is likely to support the small and marginal farmers for generation of adequate income and gainful employment year round (Dash *et al.*, 2015).

Rice is one of the major crops grown in Rangareddy district of Telangana. It is grown on an area of about 32,000 hectares with a productivity of 2.6 t/ha. Majority of the farmers in this region are small and medium and the scope for enhancing rice yield is limited and the livelihood of the small and marginal farmers' is on stake. Marginal and small farmers in general are illiterate, financially handicapped, their holdings are small and scattered not suited for high tech agricultural machinery, work in resource poor and risk prone diverse conditions. A rural family having six members including two children requires approximately Rs. 64,000/- per annum for livelihood security. This has to be derived from the income from farming and allied enterprises (Ray, 2009). The need for diversification in the district is imminent as the income of farmers who depend solely on the produce of their traditional mono crop of rice pattern is decreasing due to narrow margin of profitability and changed food consumption habits. This demands for an urgent need to evaluate various IFS model equivalent or superior to rice-rice system. The present study was, therefore, undertaken in Rangareddy district of Telangana to assess the profitability of various rice based farming systems on small farms.

MATERIALS AND METHODS :

Telangana is the 29th state of India, formed on the 2nd of June 2014. The state has an area of 1,14,840 sq. km and has a population of 3,52,86,757. The total area under food and non-food crops in Telangana is 6.28 million hectares during 2013-14. Rice plays an important role in the economy of Telangana and it is cultivated on an area of 1.67 million hectares with a production of 4.9 million tonnes.

The present study is conducted in Rangareddy district of Telangana. The district is located in the Central Part of the Deccan Plateau and lies between 16^0 30| and 18^0 20| of North Latitude and 770 30| and 790 30| of East Longitudes bounded on the North by Medak district, on the East by Nalgonda district, on the South by Mahabubnagar district and on the west by Gulbarga district of Karnataka state. Rangareddy district has been the meeting ground for the fusion of various civilizations, religions, races, cultures, languages and traditions with the twin cities of Hyderabad and Secunderabad as its core. It covers an area of 7564.8 sq. km. Red soils predominate in the district followed by Black soils. However, the Black soils are predominant in the selected villages of Shahbad mandal of Rangareddy district. The climate of the district is characterized by a hot summer and is generally dry except during the southwest monsoon. The district has a normal rainfall of 781.0 mm. Major crops grown in the district are rice, redgram, cotton, maize, jowar, greengram, blackgram and castor. Majority of the farmers in the district are small and marginal farmers.

An analysis study on rice based farming systems was conducted in 2014 and subsequently the front line demonstrations were organized during 2015 and 2016. The sample consisted of 36 farmers from three village's *viz*., Chinna Solipet, Rudraram and Devunigadda villages of Rangareddy district of Telangana state. By the virtue of their proximity to the city of Hyderabad, these villages have a vast area under vegetable cultivation with rice grown mainly for home consumption. The six cases of integrated rice based farming systems for the study were selected based on the maximum number of integrations adopted by the farmers in the selected villages. A bench mark survey was conducted prior to the cropping season *viz*., *Kharif* to analyse the input use pattern and issues being faced by farmers in rice-based farming systems. Majority of the farmers' reported poor yield, labour problem and low returns from the existing systems. Therefore, the front line demonstrations (FLDs) on cost effective and labour saving rice production technologies were undertaken in an area of 5 ha each in Chinna Solipet, Rudraram and Devunigadda villages of Shabad mandal of Rangareddy district of Telangana.

A series of farmer-scientist interactions were organized to create awareness about cost effective

technologies to strengthen the rice based integrated farming systems. The technical knowledge on cultivation practices for rice, vegetable and dairy production including use of herbicide for weed control and cono weeder for labour saving and drudgery reduction in rice based systems were provided to the farmers through trainings. As per the FLD norms physical inputs like seed, herbicide (Penoxsulam), leaf colour chart (LCC), sprayers were provided only for rice production however, the manual weeder can be used in vegetable cultivation also. The correct application of herbicide and precautions in the use of herbicide were also demonstrated to the farmers. It was observed before the conduct of FLDs that the farmers were applying more than the recommended doses of inputs and also were facing acute labour shortage for various operations in rice cultivation in general and weeding, harvesting and threshing in particular. Data was collected from farmers by personal interview method using a pre-tested interview schedule. The net returns and profitability of each of the rice-based farming system was worked out by calculating the B:C ratio.

RESULTS AND DATA ANALYSIS :

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Cost effective technologies in rice based farming systems :

The FLDs on 'cost effective technologies in rice based farming systems' were undertaken in Chinna solipet village of Shabad mandal of Rangareddy district of Telangana in 2015. Herbicide (Penoxsulam), leaf colour chart (LCC) and sprayers were distributed to farmers. The cost effective technologies demonstrated and the yield advantage of the hybrids over the inbred has resulted in an additional yield of 43.75 per cent on FLD fields over the check, Tellahamsa (Table 1). The technologies demonstrated on fields also resulted in a reduction in cost of cultivation by about Rs.5750/- ha. Besides, due to the acute labour shortage during the peak operation periods in general and weeding in particular application of herbicide with knapsack sprayer was perceived as the best coping strategy for labour shortage. The cost effective technologies resulted in reduced cost and labour requirement which were highly appreciated by the beneficiary and other farmers.

The FLDs on Input saving technologies were undertaken in an area of 5 ha in Rudram Village of Shabad mandal of Rangareddy district of Telangana (Table 2). It was observed before the conduct of FLDs that the farmers were applying more than the recommended doses of inputs like seeds and also were facing acute labour shortage for various operations in rice cultivation in general and weeding, harvesting and threshing in particular. The technology package demonstrated comprised of improved samba mahsuri variety, herbicide, leaf colour chart and mechanical harvesting.

The input saving technologies demonstrated recorded a yield advantage of 16 per cent. The technologies demonstrated on fields also resulted in a reduction in cost of cultivation by about Rs.6500/- ha. Besides, due to the acute labour shortage during the peak operation periods in rice, application of herbicide and mechanical harvesting with combine harvestor (hired),

Table 1 : FLD on cost effective technologies in rice

Technology demonstrated	Local check	Mean FLD yield	Mean check yield	% yield advantage
Cost effective technologies (Herbicide, LCC and Sprayers)	Tella hamsa	6.9 t/ha	4.8 t/ha	43.75

Table 2 : FLD on input saving technologies in rice

Technology demonstrated	Local check	Mean FLD yield	Mean check yield	% yield advantage
Input saving technologies (Improved samba mahsuri, herbicide, LCC and mechanical harvesting)	Tella hamsa	45	38.75	16.12

Table 3: FLD on drudgery reducing technologies in rice

Sr.No.	Technology demonstrated	Area (ha)	Local check	FLD yield (t/ha)	Check yield (t/ha)	%yield advantage
1.	Drudgery reducing rice production technologies(weeder,herbicide)	5	Farmers' practice	4.8	4.6	4.35

were perceived as the best coping strategies for labour shortage.

Drudgery reducing technologies in rice based farming systems :

The FLDs on drudgery reducing technologies were organized in 5 hectares on farmer's fields in Rudraram Village of Ranga Reddy district, Telangana (Table 3). The technology package comprised of use of herbicide (penoxsilum) to control weeds and use of manual weeder to reduce drudgery of manual weeding. The use of manual weeders was also demonstrated as a labour saving strategy as there is scarcity of labour and also the cost of labour is high in this area as women labour prefers cotton and vegetable crops to rice. A pre-*Kharif* group discussion was organized to disseminate information on advantages of adopting pre-emergence herbicide for weed control and saving of labour employed for manual weeding.

The correct dosage, method and time of application were demonstrated on the farmer's fields. Skill training on use of manual weeder was organized for farm women. The FLD beneficiary farmers reported that the herbicide was very effective in controlling weeds and only one weeding was carried out with manual weeder distributed to them under FLD inputs. On an average Rs. 1200/acre was saved on labour costs by using the herbicide and manual weeder. Moreover, the FLD beneficiary women were convinced and happy to use the weeder to reduce their drudgery of manual weeding. The average yield obtained was 4.8t/ha.

The findings in Table 4 indicate that rice-rice, rice – pigeonpea-vegetable, rice-vegetable-dairy, rice-cotton-vegetable, rice-vegetable-cattle, rice-vegetable-sheep and rice- vegetable-fodder-dairy were the major rice based farming systems existing in the study area. The conventional rice-rice cropping system had the total area under rice in both the *Kharif* and *Rabi* seasons. In case of rice-pigeonpea-vegetable cultivation, out of the total area, half each was allocated to rice and pigeonpea in *Kharif* and the total area was under vegetable cultivation in *Rabi* season. Brinjal, carrot, beetroot, tomato and French beans were the major vegetables grown in the study area. Rice was cultivated in *Khari*f and vegetable in *Rabi* in rice-vegetable-cattle farming system. It was reported by the farmers that, buffalo formed an important component of their farming system as it was considered to be a valuable and critical asset of the farmers in supporting their livelihoods particularly during unfavourable rainfall conditions affecting crop yields. Several other studies have also reported that, mixed farming systems with rice, vegetable and dairying, provide flexible asset regime and reduce risk and vulnerability of the small and marginal farmers. In case of rice-vegetable-fodder –buffalo system dual purpose sorghum varieties were grown to meet the food and fodder needs.

Profitability of different rice based farming systems models :

From the findings in Table 5 it can be inferred that, the integration of rice with pigeonpea and vegetable was

Table 4 : Allocation of area under different components of rice based farming system (ha)

Rice based farming system	Rice	Pigeonpea	Vegetable	Cotton	Fodder
Rice-rice	0.8				
Rice-pigeonpea-vegetable cultivation	0.2	0.2	0.4		
Rice-vegetable-dairy	0.4	0.4			
Rice-cotton-vegetable cultivation	0.2		0.4	0.2	
Rice-vegetable-sheep	0.4		0.4		
Rice-vegetable-fodder (Fodder sorghum)-dairy	0.4		0.2		0.2

Table 5 : Profitability of different rice based farming systems models

Sr. No.	Particulars	Cost of cultivation (Rs./acre)	Gross returns (Rs./acre)	Net returns (Rs./acre)	B:C ratio
1.	Rice-rice	36320	68440	32120	1.9
2.	Rice-pigeonpea-vegetable	24380	95320	70940	3.9
3.	Rice-vegetable-dairy	45260	118440	73180	2.6
4.	Rice-cotton-vegetable	35380	95320	59940	2.7
5.	Rice-vegetable- sheep rearing	29460	100640	71180	3.4
6.	Rice-vegetable-fodder-dairy	41510	96440	54930	2.3

found to be highly profitable with net returns of Rs. 70940/- per acre and a B:C ratio of 3.9 followed by integration with vegetable and sheep rearing with a B:C ratio of 3.4. This is mainly because of highly remunerative vegetable cultivation and also as the sheep rearing does not require much extra attention. These results are in support to the studies conducted by Deshmukh *et al.* (2013).

Rice-vegetable-dairy farming and rice-vegetable-fodder-dairy farming were remunerative with a B:C ratio of more than 2 owing to better management and recycling of resources. The surplus of buffalo dung and sheep dropping was utilized as valuable organic manure to the crop component. The results also indicate that the mono cropping of rice alone is comparatively less profitable with a B:C ratio of 1.9 than the rice based integrated farming systems. Studies by Jayanthi *et al.*(2000); Kumar *et al.* (2012) and Dhiman (2013) also reported a higher net returns with integrated farming systems.

Thus, it can be concluded that rice cropping integrated with vegetable and pigeon pea cultivation/sheep rearing was highly productive and profitable. It can be advocated for small and medium farmers in the study area. This is profitable alternate system for conventional rice monocropping. The results corroborate with the findings of Chennabasavanna *et al.* (2009).

Conclusion :

The results of the study revealed that the rice based farming systems resulted in enhanced profitability and nutritional security of the farmers. Besides enhanced net returns, the soil productivity is also sustained through recycling of nutrients from the enterprises involved in the rice based farming system. There is a reduction in the cost on cultivation in rice especially, through the reduced requirement for inorganic fertilizers, as the nutrients are recycled through organic manure. Hence, it can be concluded that rice based farming systems is an important strategy to sustain the higher farm profits and to sustain soil productivity, and also to meet the food and nutritional needs of the farm families. The adoption of rice based farming systems is one of the best ways to improve the livelihood of the small farm holders.

Authors' affiliations:
AMTUL WARIS, ICAR-Indian Institute of Rice Research, HYDERABAD (TELANGANA) INDIA

LITERATURE CITED :

Chennabasavanna, A.S., Biradar, D. P., Prabhudev, K. N. and Hegde, Mahabhaleswar (2009). Development of profitable integrated farming system model for small and medium farmers of Tungabhadra project area of Karnataka. *Karnataka J. Agric. Sci.*, **22** (1) : 25-27.

Dash, A.K., Ananth, P.N., Singh, S., Banja, B.K., Sahoo, P.R., Pati, B.K. and Jayasankar, P. (2015). Empirical proof on benefits of integrated farming system in small holder farms in Odisha *Curr. Agric. Res. J.*, **3**(1) : 69-74.

Deshmukh, R.C., Jadhav, Balaji and Biradar, Gayatri (2013). Integrated farming system for strengthening rural livelihood in disadvantaged areas of Bidar district. *Internat. J. agric. Sci.*, **9** (1): 57-59.

Dhiman, Mukherjee (2013). Potential integrated farming system model in mid hill region of West Bengal situation.*Ann. Agric. Res. New Series*, **34** (3) : 264-268.

Gupta, V., Rai, P.K. and Risam, K.S. (2012). Integrated crop-livestock farming systems: A strategy for resource conservation and environmental sustainability. *Indian Res. J. Extn. Edu., Special Issue*, **2** : 49-54.

Jayanthi, C., Rangasamy, A. and Chinnusamy, C. (2000). Water budgeting for components in lowland integrated farming systems, *Agric. J.*, **87**: 411-414.

Kumar, Sanjeev, Subash, N. , Shivani, S., Singh, S. S. and Dey, A. (2012). Evaluation of different components under integrated farming system (IFS) for small and marginal farmers under semi-humid climatic environment. *Experimaental Agric.*, **48** (3) : 399-413.

Lal, R. and Miller, F.P. (1990). Sustainable farming for tropics. In: Singh, R.P. (Ed.) Sustainable agriculture: Issues and Prospective. Vol.**1** , pp. 69-89, Indian Society of Agronomy, IARI, NEW DELHI, INDIA.

Mukherjee, Dhiman (2013). Potential integrated farming system model in mid hill region of West Bengal situation. *Ann. Agric. Res. New Series*, **34** (3) : 264-268.

Ray, D.P. (2009). Livelihood security in rice based farming systems. In : Invited Papers and Abstracts of the National Seminar on Managing Rural Livelihood in India: Challenges and Opportunities. Orissa University of Agriculture and Technology, Bhubaneswar, Odisha. pp: 1-5.

Sujit, K. Nath, H. K. De and Mohapatra, B. K. (2016). Integrated farming system: is it a panacea for the resource-poor farm families of rainfed ecosystem? *Curr. Sci.*,**110**(6):969-971.